

REMARKS*A. Status of Application*

The Specification has been amended to correct minor inadvertent typographical errors. No new matter was introduced. Claims 1-39 are pending. Claims 1 and 33 been amended. No new matter was introduced. Claims 1-39 remain pending.

B. Section 102 Rejections

Claims 1-11, 15-22, and 25-36 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,841,141 to Gullberg *et al.* In light of the claim amendments and comments below, Applicant respectfully traverses.

1. The Gullberg Reference Does Not Anticipate Claims 1-11

Independent claim 1 has been amended and now recites:

A method, comprising:

determining an apex of a cone from a trajectory of a photon emitted from an object to a point of intersection on a first detector;
determining an axis of symmetry of the cone from the point of intersection on the first detector and a point of intersection on a second detector;
using a finite set of integrals dependent on the apex of the cone, the half angle of the cone, and the axis of symmetry of the cone to satisfy a completeness condition; and
using the finite set of integrals for image reconstruction.

Support for the amendment may be found, for example, beginning on page 6 under the “Relating Surface Integrals to a Distribution of Radioactivity” section and/or beginning on page 11 under the “Relating Line Integrals to a Distribution of Radioactivity” section. In one respect, the Specification provides

symbol $S(\Phi, \beta, \psi)$ may denote the surface integral of the distribution of radioactivity on the one sheet cone whose apex may be the point Φ , axis of symmetry may be the unit vector β , and half angle may be ψ . See Specification, page 7 and page 12.

The element of using a finite set of integrals dependent on the apex of the cone, the half angle of the cone, and the axis of symmetry, amongst others, is clearly recited in claim 1 and is absent in the Gullberg reference.

The Gullberg reference is directed to image reconstruction using V-projections. *See* Title and Abstract. To achieve this, Gullberg discloses finding semilines L_1 and L_2 to define the V-shape. *See* column 4, lines 21-22. A projection data generator is used to generate “projection data represented by a function $q(x', x'', \text{and } \beta)$ ” and subsequently converts the “V-projection data into an image reconstruction.” (Column 4, lines 24-26 and line 46). Referring to FIG. 2B, provided below for the Office’s reference, x' is where a photon strikes the first detector, x'' is the location where the photon is absorbed by the second detector, and β is the angle upon scattering, *e.g.*, the Compton angle. *See* FIG 2B and column 3, line 60 through column 4, line 4.

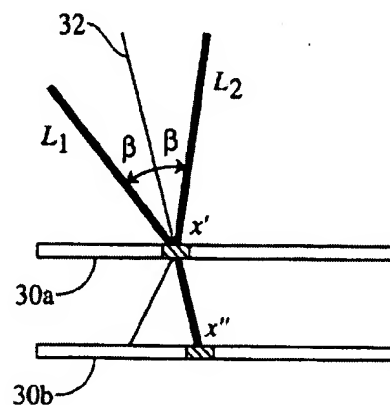


Fig. 2B

The Gullberg reference provides Equation 2 which is an integral function of the semilines that represents the function $q(x', x'', \text{and } \beta)$. Neither function $q(x', x'', \text{and } \beta)$ nor Equation 2 can be construed as using a finite set of integrals dependent on the apex of the cone, the half angle of the cone, and the axis of symmetry of the cone to satisfy a completeness condition, as recited in claim 1.

For at least the above reasons, claim 1 and its dependent claims are patentably distinct over the Gullberg reference. Applicant respectfully requests the removal of the § 102 rejection.

2. *The Gullberg Reference Does Not Anticipate Claims 1, 15, 25, 26, 27, and 33*

Independent claims 1, 15, 25, 26, 27, and 33 each recite satisfying a completeness condition. Referring to, for instance, Example 1 beginning on page 15, a set of integrals may be

needed to obtain an image. To determine that the set is complete, a completeness condition is provided, where for surface integrals, the completeness condition is:

If on almost every plane that intersects a sphere with a radius bigger than the distribution, there is an apex where all surface integrals emanating from the apex whose axis of symmetry is normal to the plane are known, then the distribution of radioactivity can be obtained from the known integrals.

Similarly, the integrated line integral completeness condition is:

If on almost every plane that intersects the distribution, there is an apex where all the integrated cone-beam line-integrals emanating from the apex whose axis of symmetry is normal to the plane are known, then the distribution of radioactivity can be obtained from the known integrated line-integrals.

This element is absent from the Gullberg reference. Because the Gullberg reference lacks the disclosure of explicit elements of every independent claim, it cannot serve as an anticipatory reference. Applicant respectfully requests the removal of the § 102 rejection to independent claims 1, 15, 25, 26, 27, and 33 and their respective dependent claims

C. Section 103 Rejections

1. Claims 12 through 14 are Patentably Distinct

Claims 12 through 14 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Gullberg reference in further view of U.S. Patent No. 6,628,984 to Weinberg *et al.* In light of the claim amendments and comments below, Applicant respectfully traverses.

As noted above, the Gullberg reference fails to teach or suggest all the elements of independent claim 1. In particular, the Gullberg reference fails to disclose satisfying a completeness condition. The Weinberg reference does not cure the deficiencies.

The Weinberg reference is directed to a tomographic imaging system comprising a moveable detector for detecting radiation. *See* Summary of the Invention. In one respect, a backprojection method is used to determine “the position of the source and to provide a three dimensional mapping or representation of the source, which for example, can be a lesion in a patient that has been injected with a gamma ray emitting radiotracer.” (Column 4, lines 62-67). Nowhere in the Weinberg reference is a completeness condition discussed or contemplated.

For at least the above reasons, Weinberg reference, separately or in combination with the Gullberg reference, fails to teach or suggest the elements of claim 1 and its dependent claims (including claims 12 through 14). Applicant respectfully requests the removal of the § 103 rejection to claims 12, 13, and 14.

2. *Claims 23 and 24 are Patentably Distinct*

Claims 23 and 24 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Gullberg reference in further view of the publication entitled “Lamb Wave Tomographic Imaging System for Aircraft Structural Health Assessment” to Schwarz *et al.* Applicant respectfully traverses.

The Schwarz publication is directed to an image reconstruction method using a Lamb Wave imaging system. *See* Figure 2 and the supporting text. Nowhere in the Schwarz publication is satisfying a completeness condition disclosed, as recited in independent claim 15.

Because the Gullberg reference and/or the Schwarz publication fails to teach or suggest satisfying a completeness condition, claim 15 and its dependent claims (including claims 23 and 24) are patentably distinct over the combination. Applicant respectfully requests the removal of the § 103 rejections to claims 23 and 24.

3. *Claims 37 through 39 are Patentably Distinct*

Claims 37, 38, and 39 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Gullberg reference in further view of U.S. Patent No. 5,175,434 to Engdahl *et al.* Applicant respectfully traverses.

The Engdahl reference is directed to a Compton camera system including a Compton camera, a first detector, and a second detector surrounding the first detector, such that the count rate is increased and an image can be obtained in a shorter amount of time. *See* FIGs. 2 and 3 and the corresponding text. The Engdahl reference fails to teach or suggest satisfying a completeness condition, as recited in independent claim 33.

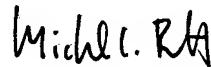
For at least the above reasons, claims 37 through 39 (dependent claims of claim 33) are patentably distinct over the combination of the Gullberg reference and the Engdahl reference. Applicants respectfully request the removal of the § 103 rejections to claims 37-39.

CONCLUSION

Applicant believes the foregoing to be a full and complete response to the subject Office Action, and respectfully requests the withdrawal of the rejections to claims, the allowance of claims 1-39 and the issuance of a timely Notice of Allowance.

Should the Examiner have any questions, comments, or suggestions relating to this application, he is invited to contact the undersigned attorney at (512) 536-3018.

Respectfully submitted,



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